CHAPTER 2

GUIDELINES FOR PREPARING THE PROJECT NARRATIVE

The following is a detailed discussion of the key information needed to evaluate proposals against the TIP evaluation and award criteria. Although the specific format below is not required, to be competitive a proposal must address all components of the evaluation and award criteria. TIP reviewers are familiar with the technology discussed in the proposal; however, reviewers are limited to using only what is provided in the proposal to evaluate the project against the TIP evaluation and award criteria.

A. DEFINITIONS

In preparing a proposal it is important to keep a few key definitions in mind. (A complete list of definitions can be found in 15 C.F.R. § 296.2.)

1. Critical National Need is an area that justifies government attention because the magnitude of the problem is large and the societal challenge(s) that need to be overcome are not being addressed, but could be addressed through high-risk, high-reward research. Note that each competition will focus on specific societal challenge(s) within one or more areas of critical national need as identified in the *Federal Register* notice announcing the competition.

2. High-Risk, High-Reward Research is research that has the potential for yielding transformational results with far-ranging or wide-ranging implications. The proposed research should address specific societal challenge(s) within one or more areas of critical national need as outlined in the competition solicitation. TIP awards are designed to support, promote, and accelerate innovation within the United States in scientific and technical areas that are too novel or that span too diverse a range of disciplines and would otherwise not find adequate funding from viable alternative sources.

3. Societal Challenge is a problem or issue confronted by society that when not addressed could negatively affect the overall function and quality of life of the Nation, and as such justifies government attention.

4. Transformational Results are the potential project outcomes that enable disruptive changes over and above current methods and strategies. Transformational results have the potential to radically improve our understanding of systems and technologies, challenging the status quo of research approaches and applications.

B. EXECUTIVE SUMMARY

The proposal should begin with a brief, two-page Executive Summary that presents the major ideas in the proposal. TIP recommends that the summary be completed after the other sections have been written. The summary should be well thought out and should carefully map the salient points of the proposal to ***all*** TIP evaluation and award criteria. Do not create a summary by simply cutting and pasting sections from the body of your proposal. Use the summary to present a high-level storyline of the proposal against the criteria.

C. PROJECT NARRATIVE

To facilitate proposal writing and the TIP evaluation process, TIP recommends that the narrative address each of the six sections outlined within Chapter 2. These sections explain the TIP award criteria (15

C.F.R. § 296.22), and the requirements of a quality proposal against the evaluation criteria (15 C.F.R. § 296.21).

- **Chapter 2 Sections C.1-C.3** describes the portions of award criteria used in the Preliminary Review to determine if the proposal is eligible for further consideration by the Evaluation Panel. Proposals that warrant further consideration will be considered against the evaluation criteria, described in sections 4, 5, and 6, and all award criteria, described in all six sections.
- **Chapter 2 Section C.4** describes the scientific and technical merit of the proposal. The competitiveness of your narrative addressing this evaluation criterion contributes 50% toward the Evaluation Panel's consideration of your proposal.
- **Chapter 2 Sections C.5-C.6** describes the requirement for how the project will advance the state-of-the-art and contribute significantly to the U.S. science and technology base, and how the results of the project have a strong potential to address the societal challenge(s) and will enable the anticipated transformational results. The competitiveness of your narrative addressing this evaluation criterion discussed within Sections 5 and 6 combined, contributes the remaining 50% of the Evaluation Panel's consideration of your proposal.

The Evaluation Panel's review and recommendation is ultimately based on how well the proposal addresses ***all*** award and evaluation criteria.

1. Why is TIP Support Necessary?

In the first section of the project narrative, describe why the project needs TIP funding, the first TIP award criteria. Include the following:

a) Discuss why the specific project needs taxpayer funds. **Do not** merely restate the solicitation or discuss the technical area in general.
b) Provide evidence to show how the Nation will benefit from the project receiving TIP funding.
c) Relate the specifics of the project to addressing the societal challenge(s) within a critical national need identified in the solicitation.
d) Discuss what will happen to the project with and without TIP funding, including the consequences to the research and the impact on the societal challenge(s). Include any evidence that the research will not be conducted within a reasonable time period in the absence of TIP funding.

2. Efforts that the Proposer Has Made to Secure Alternative Funding

The second TIP award criterion requires that the proposer demonstrate that ***reasonable and thorough*** attempts have been made to secure alternative funding from other relevant sources before applying for TIP funding, and that no other alternative funding sources are reasonably available to support the project. Information about the efforts that have been made and the reasons for being turned down for those funds are important to TIP. TIP's statutory award criteria require that proposers have adequately sought alternative funds, but that such funds are not available or not available in a reasonable time period (e.g., the time period critical to a window of opportunity for realizing the impacts from the project).

In this section, each proposer, including each joint venture member if a joint venture, must describe its efforts to obtain:

a) Internal funding.
b) External private funding.
c) External public (government) funding.

If one of these sources is unavailable to one of the proposers, indicate that this type of funding is unavailable ***and the reason(s)***

***why it is unavailable*.** For some joint venture members, a reason may be that these members did not originate any of the key research ideas involved in the project. Without the reasons behind the unavailability of each type of funding, your rationale for why TIP support is necessary is not likely to be competitive in the Preliminary Review.

Internal funding includes working capital, retained earnings, or other internal resources for companies and research funds for universities. Include a discussion of the decision-making process and priorities the organization uses for allocating internal funds for research and development. For companies, this is especially important if the proposed technology is part of the core technology of the organization. Provide the ***reason(s)*** why those efforts were not successful.

Each proposer, including each joint venture member if a joint venture, must also describe its efforts to seek funding from external private sources. For companies, this includes angel investors, venture capital funds, financial entities, and industry partners. For universities, this includes foundations. Discuss the ***reason(s)*** why these efforts were not successful. Be sure to include a discussion of how private investors viewed the technology risk and timing associated with the proposal's approach.

Lastly, describe the effort that each proposer, including each joint venture member if a joint venture, made to seek funding from other external public (government) sources (federal, state, and local). Describe any past or current submissions that have been made to other government agencies and the outcome or current status of those submissions. If there are other sources of public (government) funds that have not been contacted, explain why not.

Proposals that address why each type of funding – internal, external private sources, and external public (federal, state, and local) sources is unavailable will be more competitive.

For joint ventures, a table listing all the members and indicating their efforts in all three areas can be helpful.

For all proposers, include at the end of the proposal any letters documenting efforts to secure other funding. If no letter is available, then provide, as an appendix, a table with a brief paragraph for each unavailable letter or additional documentation of the effort, including: the name(s) of the person(s) who formally decided not to fund the project, their title and organizational affiliation, the reason given for the decision, the date the decision was conveyed, and to whom the decision was conveyed. Neither the letters, nor the summary table of descriptions documenting specific contacts with potential funding sources, counts against the proposal page limit.

3. Novelty of the Proposed Research (Technology) Results With Respect to Competing Developments

The third TIP award criterion requires that the ***results*** of TIP-funded research must be novel and that funded proposals ***demonstrate*** this aspect of novelty. TIP evaluates novelty from two perspectives: novelty of the research results or outcomes (this section, Chapter 2 Section C.3) and novelty of the research approach itself (Chapter 2 Section C.4a). It is not the purpose of TIP to foster the development of research results or technologies similar to those that other entities have developed, commercialized, marketed, distributed, or sold (i.e., "is it out there in the public domain yet?").

Discuss any similar or competing research results (technologies) that other entities appear to have developed, commercialized,

marketed, distributed, or sold. Identify these efforts and explain in science-based detail why your proposed research results (technologies) are novel and extend the state-of-the-art. Provide specific examples that demonstrate the claims of novelty and reference potentially competing efforts within your bibliography. Specify why your potential results (technologies) have the potential to more fully address the societal challenge(s), while the apparently competing technology in development or that already exists does not, will not, or could but to a significantly lesser extent, in a manner that is clearly stated.

When discussing the novelty of your proposed results (technologies) against similar or competing solutions, keep the following in mind:

a) What are the key systems requirements and performance metrics for your proposed solution, and how do they differ from current technologies or potentially competing results and extend the state-of-the-art?
b) How are your research results transformational and how do they enable a disruptive change over and above current methods and strategies?

A direct comparison of requirements and metrics associated with the proposed effort against the alleged competing efforts, can be critical to making a proposal competitive, and demonstrates the case of this aspect of novelty required by TIP.

4. Scientific and Technical Merit and How the Research May Result in Intellectual Property

It is in this section where the proposer(s) address the first of the two TIP evaluation criteria, namely the scientific and technical merit and how the research may result in intellectual property vesting in an U.S. entity. Successful proposers must adequately elaborate on ***all*** of the following elements:

a) The second aspect of novelty–the novelty of the proposed research approach.
b) How the research addresses the technical needs associated with a major societal challenge not currently being addressed.
c) The high-risk, high-reward nature of the research approach and potential outcomes.
d) The team's expertise.
e) A scientifically sound technical plan with milestones and associated metrics, and access to adequate resources (e.g., equipment and facilities).

a. Novelty of the Proposed Research Approach

To be competitive, the proposal must convince expert reviewers that the research project itself is novel. Novel research refers to the technical approach and means the research effort is new, uncommon, unusual and not currently being sufficiently addressed. The research approach can be completely novel or a novel integration of existing or new technologies.

However, to be competitive, the proposed research is expected to be transformational, not just an incremental or predictable next step in the evolution of an existing technology (e.g., not a dramatic challenge to the status quo), and not just a combination of existing technologies in a new format. Transformational research enables disruptive changes beyond current methods and strategies, with the potential to radically improve the understanding of systems and technologies.

Therefore, describe how the proposed research is particularly innovative relative to alternative approaches being pursued by domestic and foreign competitors or elsewhere within the proposing team's organization(s). Who are the competitors and how is your proposed research novel? Describe any known related efforts that may have been unsuccessful, and how your

approach avoids or otherwise addresses the pitfalls others may have encountered. Cite relevant patents and the open literature to support this discussion. Include in the discussion a list of the key words for your searches to illustrate the detail level of your analysis.

Ignoring state-of-the-art knowledge and ongoing work by others and within the proposing team's organization(s) may lead reviewers to assume that the proposer is not aware of existing work. Discussing existing efforts helps to ensure that the difference between the proposed work and such efforts is clear.

b. Potential to Address Technical Needs Associated with a Major Societal Challenge

To be competitive, the proposal will provide a credible case that the research result(s) has the potential to address the technical needs associated with a major societal challenge(s). Proposers should include the following:

a) Identify the expected outcome(s) of a successful research plan.
b) Define measurable success criteria for the proposed research or technology efforts and provide quantifiable measures. Link these measures to the key requirements and performance metrics discussed as part of Chapter 2 Section C.3. These measures should be explained and contrasted with those for the state-of-the-art and any competing approaches.
c) Explain how the research will specifically address a solution to the societal challenge(s) within an area of critical national need. Each of the major research outcomes should have a measurable, definable end point that correlates to the solicitation's discussion of a major societal challenge.

Proposals that are predominantly basic science or that are only a best level of effort without targets for results and end points that are measurable and definable, even if they can address a major societal challenge within an area of critical national need, will be considered less competitive.

c. High-Risk, High-Reward Research

High-risk, high-reward research is core to TIP's purpose. A competitive proposal will demonstrate that the proposed research meets this requirement.

Describe the scientific risks or technical barriers that prevent significant advances in addressing the societal challenge(s) within an area of critical national need. The proposal must clearly describe ***what and where*** the high technical risk challenges are that must be overcome for the project to succeed. Describing high technical risk also entails articulating how the results have the potential for far- or wide-ranging implications if the risks are overcome, as well as why the proposer believes the research may be too novel or spans too diverse a range of disciplines to fare well in a traditional peer-review process. Merely expressing how costly the research plan may be is not an appropriate measure of high-risk associated with a scientific challenge.

Successfully accomplishing the proposed research and surmounting the technical challenges should result in a dramatic transformational change in the future direction and state of the technology. This "path change" should be a major leap forward, advancing the state-of-the-art significantly. Describe how the proposed research meets this test.

Proposals should provide sufficiently detailed scientific rationale to document the specific high technical risks embodied in the proposed research. The proposal must describe the technical challenges and assess the probability of success of the proposed approach(es). Demonstrate that the technical approach(es) for overcoming the challenges are built upon sound,

feasible scientific and/or engineering principles and foundations, based on early research evidence, or sound theoretical thinking. What relevant patents, open literature, or experimental results exist to support your discussion? ***TIP will not fund*** projects that violate sound scientific and/or engineering principles, or projects that propose to conduct a literature search after award to subsequently develop a detailed research plan.

TIP funds projects that seek to overcome extremely difficult technical challenges. TIP also recognizes that not every aspect of the technical plan will have high technical risk; however, the project must have an overall profile commensurate with high-risk, high-reward research.

Research (technical) risk may be high in the development of one or more single innovations within the project, or in the integration of disparate technologies, or both. Integration risk can be due to the complexity of the integration effort, unknown properties of the components to be integrated, or other factors. Critical to an explanation of high-risk for integration efforts is explaining what new knowledge could result from overcoming the risks and whether the risk is in the integration approach or in the technologies to be integrated. The high cost of integration by itself does not sufficiently justify a claim of high technical risk.

The proposal should also describe the technical and scientific impact (leverage or high-return) that will be derived from the research proposed. Technical leverage is the possibility of using the research results or approach beyond the initial applications. Summarize the technical impact and leverage of successfully accomplishing the proposed research and overcoming the high technical risks. It is often helpful to discuss technical impact and leverage from the perspective of a fully successful, as well as a partially successful, effort.

d. Qualifications of Proposed Research Team

In this section, the information required about the key technical team members that will work on your project will be described. Most projects require a multidisciplinary approach to overcome technical barriers. Describe the quality and appropriateness of the technical staff assigned to the project, and the amount of time each individual will allocate to the project. Briefly highlight the educational background and experience of key personnel, including contractors. TIP may request two-page resumes for each key team member during the review by the Evaluation Panel. If key staff will be hired, describe the qualifications needed for key positions not yet filled and the timeline for hiring these staff.

e. A Scientifically Sound Technical Plan with Tasks, Milestones, Timeline, Decision Points, and Alternate Strategies

A sound, detailed technical plan that addresses all aspects of this subsection, (e.1 through e.4) is necessary for a proposal to be competitive. The technical plan must explain ***how*** the research and technical objectives will be reached. It must address the “what, how, where, when, why, and by whom” in ***substantial detail***. It must anticipate likely scientific or technical problems and describe how these problems will be overcome. The technical plan should therefore detail each key research activity and provide the basis for project management oversight of that activity should TIP issue an award.

In the case of a joint venture, the technical plan must demonstrate the requirements of substantial involvement of the two foundational joint venture members, as explained in Chapter 1 Section B.2. The technical plan must show how each joint venture member is contributing to the technical development.

Many proposals are not competitive, although they may have meritorious technical goals, because the proposal provides only a vague plan on how to reach the goals. It is not adequate to merely describe the established technical barriers and provide only an overview of the research paths. TIP requires a more detailed technical plan to evaluate how the project goals will be met, and interim measures of progress (e.g., milestones with appropriate metrics) for key research tasks.

TIP must be able to track the project from the initial work to the end of the project results. A detailed technical plan is critical for effective project management, for development of a reasonable budget, and for good communication between the TIP Project Manager and the Principal Investigator.

(1) Technical Approach–The elements of the technical plan must fit together in a reasonable and logical way to instill confidence that the team can implement and conduct the proposed approach.

The following sub-elements in the technical plan are required:

(a) Tasks and Subtasks–Discuss how the work will be organized into tasks and subtasks. Provide clear descriptions for tasks and subtasks performed by operational units within the proposing organization as well as by any contractors. Clearly identify these contractors if known at the time of proposal submission. If the contractor is not known, provide the qualifications needed to perform the proposed contract work. Explain the technical rationale for the major tasks. Indicate the level of risk of each task (e.g., high, medium, low). Clearly link tasks in the budget to the performing organization(s), specifically, each joint venture member if a joint venture, and to contractors (where appropriate). Highlight major risks and innovations inherent in specific tasks and the strategies, including alternate pathways, for managing unexpected results. High-risk research often needs contingency plans, alternate or parallel technical approaches for carrying out key portions of the technical work. Discussing these alternatives is part of a competitive technical plan. Highlight the level of risk and innovation inherent in each of these approaches in the proposal and compare them to the primary approach. Proposals that contain alternate or parallel efforts that significantly reduce the overall proposal's profile of research risk, or novelty of the research innovation, may be considered less competitive.

(b) Interrelationship of Tasks–Discuss how the tasks link to one another, which tasks depend on others, which tasks are sequential, and which tasks will be done in parallel. If contingency plans are used in the event the primary approach is unsuccessful, describe how these tasks will be incorporated, and under what conditions.

(c) Milestones–Provide appropriate interim and final key milestones for each year of the technical plan (by project years, not calendar years) and tie these to appropriate interim and final metrics for tracking progress toward successful results. Identify the organization responsible for, or with a key contribution to, each milestone. Milestones are critical for tracking progress made in the project. Include a discussion of the strategy for validating that a critical milestone's metrics have been met. See Table 1: Milestones/Metrics for an example.

(d) Metrics–Provide clear and concrete ***quantifiable*** metrics for measuring the project's progress toward the overall technical goals (interim and final metrics). Define what technical success would look like: these metrics should relate to the project's technical objectives, targets, milestones, and success criteria. Quantify the extent to which this advances the current state of the technology. Metrics used at decision points to decide on proposed next steps are critical. (See Table 1.)

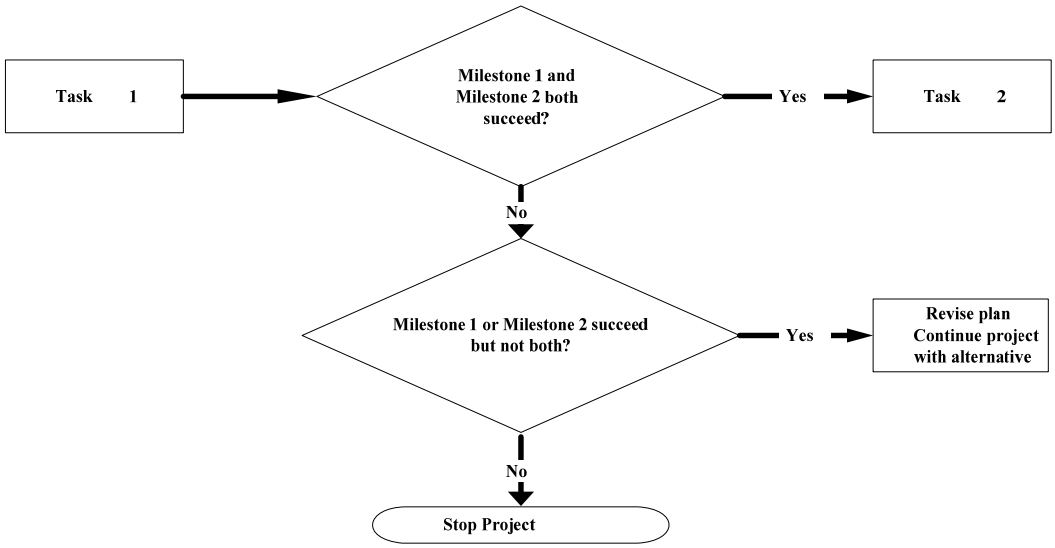
(e) Decision-Point Strategy–Provide go/no-go and other decision points for the project as appropriate. High-risk research can fail. Well-defined decision points provide a roadmap in terms of milestones and metrics showing a validated, quantifiable way that a project or line of research has succeeded or failed. For example, if a new material passes a stress test at a milestone, the decision is clearly to continue. If it fails the stress test at that milestone by a significant amount, then the project plan may recommend a designated alternate approach. If the designated alternative fails, then the project plan may define this as a no-go decision point that terminates the project. Projects that pursue more than one technical approach in parallel must discuss how the decision to select among those approaches will be made and when it will be made in the decision-point strategy.

A good decision-point strategy identifies early go/no-go decision points within the first 12-18 months of a project (or earlier for a shorter project). Appropriateness of the high-risk elements of the project should fall within this time frame. Risks, milestones, metrics, and decision points must be linked in the decision-point strategy. A decision-point tree or critical-path chart may be very helpful to communicate this information. One example of a decision-point strategy is given in the Figure 1, but there are many other ways to effectively portray the information.

Table 1: Milestones/Metrics

Milestone	Timing	Responsible Organization	Metric	Minimum Value for Successful Result	Test Method	Decision
Material Down selection	First year, quarter 3	Company ABC	Figure of merit for performance (range of values)	Exceeds current technology by 200%	Series of evaluation methods	Choose optimal performance or restructure
Matrix to support cell attachment, spreading and cell in growth timing (for Engineered Rotator Cuff	Month 15	Contractor	Timing for cell attachment and spreading throughout the matrix (range of values)	Uniform cell attachment within 5 minutes of seeding and spreading within 30 minutes at all levels of modular matrix	Use of RGD covalent coupling to enhance rates of cell attachment and support spreading	If coupling is not even throughout matrix, move from static to perfusion coupling to ensure reagent matrix contact
Demonstrate functionality of candidate sensor tips	First year, quarter 2	Contractor 1	Figure of merit based on performance standards (range of values)	Sensitivity, spatial resolution, and power consumption within 70% of final targets	Verified test methods	Select superior candidate tip or re-evaluate technical approach
Integrate and demonstrate catalyst synthesis, probe reaction, miniaturized analytical methods, and informatics system	End Year 3	Company 1 (JV Lead) and Company 2	Generate 2 new candidate lead compounds for lab-scale tests using process-grade raw material feed stocks	Candidate compounds must show: a) 15% improvement in reaction yield at reduced reaction temperatures, and b) 50% higher selectivity in probe reactions	High throughput synthesis and analysis techniques	Explore different region of chemical composition space if lead compounds don't meet minimum requirements for success

Figure 1: Decision-Point Strategy (Example)



(f) Gantt Chart – Include a Gantt chart or other project timeline chart that illustrates timing of major tasks and key subtasks. These charts should include the level of risk associated with each task, the responsible individual(s) and organization(s), milestones with appropriately quantitative metrics and decision points, as appropriate, and should be consistent with your project and budget narratives. The timeline chart acts as a critical "task map" of your technical plan for reviewers and for the overall project if it is selected for funding. In addition to the timeline chart, the project tasks must be described in narrative form. It must be clear how the goals of the project will be achieved by those tasks. See Table 2 for an example.

Table 2: Gantt Chart (Example)

Tasks	Q 1	Q 2	Q 3	Q 4	Q 5	Q 6	Q 7	Q 8	Q 9	Q 10	Q 11	Q 12	Performers	Level of Risk	Major Quantitative Milestones, Metrics, and Decision Points
1.0 Task	---	---	--	--	--								Smith	High	
1.1 Subtask	---	M1											Contractor A	High	M1: Measure X must be greater than Y
1.2 Subtask		---	M2										Jones	Medium	M2: Material property P must be at least Z
1.3 Subtask		---	---	M3									Ahmed	High	M3: Test specific feature using described test plan Decision: If the test fails then use designated alternative
2.0 Task				----	----	----	----						Wilson	Low	
2.1 Subtask				----	M5								Todd	Low	M5: Component must be assembled
2.2 Subtask				----	M6								Jones	Low	M6: Component must be assembled
3.0 Task							----	----	----	M7	-	-	Wang	Medium	M7: Test system on specified dataset
3.1 Subtask										---	----	M8-	Ahmed	Medium	M8: Complete final test scenario

(2) Adequacy of Facilities, Equipment, and Resources–Briefly discuss the research facilities and specialized equipment required for this proposed project. Identify what facilities, equipment, and resources already exist for use; what will be obtained through contracting; and what must be obtained even though sources are not yet identified. Provide the timeline for obtaining needed facilities, equipment, and resources. Major equipment purchases need to be clearly linked to the appropriate research tasks and described in the project budget narrative. Any collaboration agreements for access to facilities and/or associated staff being claimed as critical to tasks in the proposal must be clearly described. Copies of these agreements may be requested during the review by the Evaluation Panel (e.g., using a federal laboratory facility to perform research tasks in the proposal under a user agreement, CRADA, or other written agreement). Descriptions of verbal agreements between parties for facilities access are not likely to be considered as competitive as those with written agreements, and may not be compliant with the requirements of the Program.

(3) Contractors–Projects may include contractors to obtain key expertise, access

to existing facilities, or specialized goods and services. Discuss what each contractor brings to the project. Clearly identify what each contractor will do and why that contractor was chosen. Please note that contract awards must be in accordance with the Procurement Standards found in 15 C.F.R. Part 14. Discuss the relationship of the work to be done by the contractor to the technical plan. Discuss how the contractor's progress will be monitored and redirected as appropriate. ***Contractors may not contribute to the cost-sharing requirement.*** *Note: If a subrecipient wants to contribute to the cost share of the recipient, this can be considered on a case-by-case basis.*

The following guidance should be considered when submitting a proposal to TIP that includes contractors:

TIP expects that the proposer, or the joint venture members if a joint venture, will direct and carry out most of the key high-risk and high-innovation tasks. For example, a single company structured as a virtual company that proposes to have contractors perform most of the high-risk tasks is not expected to be competitive, or may not be eligible for an award. In addition, a minimal joint venture structure in which one joint venture member does not have staff performing research, but contracts out all their research activities, is not likely to be competitive, and the joint venture structure is potentially at risk as ineligible for an award (see Chapter 1 Section B.2).

In system or device integration projects, the proposal should make clear how the proposer(s) is involved in integrating the technologies and taking the system forward if contractors are key players in the actual integration tasks.

Projects with high levels of contracting need to specifically address how the proposed structure is effective in terms of cost, organizational efficiency, and long-term impact of the research results.

(4) Justification for R&D Activities at non-U.S. Sites–TIP strongly discourages use of non-U.S. sites for research and development activities. In the event that the project includes work performed at a non-U.S. site, a completed Form NIST-1022H, R&D Work Performed outside the United States by the Recipient or Contractor Questionnaire (see Exhibit 11) ***must be provided***. If a portion of the project can only be carried out at a non-U.S. site because of the site's unique capabilities, the answers to the questions in Form NIST-1022H should explain the technical work to be done, the relationship of this work to the overall project, the cost of this work, the unique capabilities associated with the non-U.S. site, and why equivalent work cannot be performed within the United States.

5. What is the Potential for Advancing the State-of-the-Art?

In this section, the proposer(s) will address one aspect of the second TIP evaluation criterion, namely how the research can advance the state-of-the-art and contribute to the U.S. science and technology knowledge base. Successfully accomplishing the proposed research and surmounting the technical challenges should result in a dramatic transformational change in the future direction and state of the technology. This path change should be a major leap forward, advancing the state-of-the-art significantly, and have three key elements to describe it:

a) What might advancing the state-of-the-art look like in terms of impacts?
b) What are the potential pathways for the impacts?
c) How might the impacts cross disciplines?

a. What might advancing the state-of-the-art look like in terms of impacts?

Competitive proposals must adequately explain how the proposal advances the state-of-the-art and elaborate on ***all*** of the following elements:

a) Definition of the state-of-the-art.
b) Explanation of the difference that complete success, partial success and failure will make to the state-of-the-art.
c) Difference that knowledge of the project ***results*** will make to the broader research community especially in this area of critical national need. Note that knowledge of failure can benefit other researchers considering a variety of possible directions as well.

b. What are the potential pathways for the impacts?

Describe how research results and contributions to the U.S. technology knowledge base will diffuse beyond the proposed participating organization(s) while those organizations maintain ownership of core knowledge needed to most effectively implement the project's technical results. Describe the following:

a) Preferred strategy for disseminating the research results.
b) Preferred strategy for intellectual property ownership.
c) Timeline for implementation.
d) The role of each project participant in that strategy.
e) Inclusion of others beyond the project team in the knowledge dissemination strategy.

The strategy above may combine diverse elements such as:

a) Patenting and licensing.
b) Partnerships with potential. commercialization partners and users.
c) Demonstration projects.
d) Publishing papers or textbooks.
e) Conference presentations or seminars
f) Teaching or training.

c. How might the impacts cross disciplines?

Be sure to consider how the dissemination strategy will reach across all the disciplines that could benefit from the research results. The dissemination strategy should show how knowledge of the project will reach the research community and change the state-of-the-art.

Discuss the planned use of patents, copyrights, trade secrets, and any other forms of intellectual property protection.

6. Transforming the Nation's Capacity to Deal with Major Societal Challenges

In this section, the proposer(s) must address the final aspect of the second TIP evaluation criterion, namely:

a) How the research (technology) has strong potential to address societal challenge(s) in an area of critical national need.
b) How the benefits will extend significantly beyond the direct return to the participants in the research.

Competitive proposals must adequately elaborate on ***all*** of the following elements of this sub-criterion:

a) An analysis of the potential magnitude of the transformation or change across the Nation.
b) A plan that explains how and when results of the proposed technology will have positive effects on the project participants and the Nation more broadly.
c) The capacity and commitment of all project participants to enable or advance the transformation to the proposed research results (technology).

Competitive proposals should clearly define the societal challenge that the proposed technology is trying to solve in sufficient detail to enable clear links to be made between the problem to be solved, the

proposed solution, the dissemination of the solution, and the potential for overall impact on the Nation.

a. Potential magnitude of the transformational results

Describe how the nation's capabilities to address a societal challenge(s) in an area of critical national need will be different once the results of this research are put to use. Include the following:

a) The current baseline in the Nation's capabilities.
b) Alternative technologies that partially address the societal challenge(s) and why these are inadequate.

Competitive proposals will provide a description of the magnitude of the impact or difference that the technology will make. Describe any assumptions and document and quantify expected outcomes wherever possible. For example, benefits in healthcare could be reducing the number of accidental deaths due to errors in surgical procedures; benefits from developing new sources of sustainable energy could reduce the Nation's dependency on foreign energy sources. Be as specific and as quantitative as possible.

Be clear in the discussion about the difference or added value that TIP funding makes in realizing the societal benefits of the proposed project. In general, the competitiveness of a proposal is strengthened through a clear description of the specific change expected and the potential impact in solving societal needs.

Be sure to make clear how the results could extend beyond the initial targeted societal challenge(s).

b. How and when will the ensuing transformational results unfold?

Explain how the research results will be put to use that address the societal challenge(s). How will the research results (technology) move from the research team to those who will use it to address the societal challenge(s)? What strategies will be employed inside or out of the proposing team to realize the transformation?

Competitive proposals will adequately discuss at least the following considerations:

a) Identification of organizations that will implement the project results in usable systems.
b) Identification of the potential first users (early adopters/testers) of the implemented system.
c) Strategies to overcome barriers to technology adoption.
d) Timelines for reaching the first users and the broader community of potential users.

There will be limited positive impact on the nation if the research (technology) cannot or will not be implemented. Identify barriers that could hinder the full implementation of the proposed research (technology) if it is successful and describe how and when these barriers will be overcome. Describe the timeline for implementing the research results.

If this research will result in technology that is part of a larger system, describe any other technical breakthroughs that are needed to make this research useful to the Nation. How and when will the research and development needed for this technology take place? Who is likely to provide the technology? What is the basis for the assertions about the availability of this related technology?

c. Capacity and commitment of each participant

This section of your project narrative should address the following:

(1) Organizational Commitment–For each participant, describe the organization's effective commitment to performing the research proposed and to enable or advance

the transformation if the research is successful.

First, the commitment encompasses all resources to be brought to performing the research within the TIP project including:
a) Financial resources.
b) Time commitment of key people in the organization.
c) Equipment.
d) Dedicated facilities.

Second, this organizational commitment encompasses the commitment of each participant to enable or advance the transformation described in this section, during and after the project is completed. What resources will be available to execute the strategies being proposed?

Describe the relationship of this project to the organization's strategic vision or mission. Provide evidence of commitment from senior management to the project. TIP requires a letter of commitment signed by an authorized senior executive of the lead proposer and from each joint venture member. These letters must explicitly verify the availability of the total amount of cost-shared funds. If there are commitments from regional, state, or local agencies or private sources of capital to contribute cost-shared funds, indicate the nature of those arrangements and give evidence of the commitment. NOTE: Contractors may not provide cost share.

(2) Organizational Information--TIP needs to know about the capacity of recipients to perform the research proposed and their current financial/organizational status should the project be funded. Financial statements for contractors are not required.

For companies, provide:
a) Date and state of incorporation.
b) Ticker symbol if publicly traded.
c) Company ownership including names of individuals and investors and percentages held.

Table 3 worksheets must be provided for each privately held company that is a proposer or joint venture member as an appendix to the proposal. The worksheet does not count toward the page limit.

For other organizations, provide:
a) Type of organization (i.e., institutions of higher education, state agency, etc.).
b) Relationship to any parent organization.
c) Source of cost-share funding.

Note: If financial statements or annual reports are included as an appendix, they will be discarded before the proposal review process begins. If the proposal is recommended for funding, then the proposing single company or each joint venture member (except universities, national laboratories, and government agencies) will be asked to provide the following:
a) Privately held companies: most recent financial statements.
b) Nonprofits: may be asked for most recent financial statements after review of A-133 audit information.
c) Publicly traded companies: most recent 10-K SEC filing or annual report.

(3) Current and Past Federal Awards– Provide a list of all current and past federal R&D contracts, grants, and other awards for the previous five years and all pending federal awards in the general area of this proposal. For example, provide a list of the Small Business Innovative Research (SBIR) grants received in the technical area of this proposal for the previous five years. Include the name of the project, the funding agency/organization, the number of the grant/contract/award, the principal investigator, and the federal government contact's name and phone number. For current or past awards having some relationship to the technology being proposed to TIP, briefly describe how the proposed project is distinctly different and not a duplicative effort. See Table 4 for the required format. This can be provided as an

appendix and does not count toward the page limit.

Table 3: Financial, Employment, and Ownership Information for Previous Three (3) Years

Financial Information	Current Year to Date	Last Year	Two Years Ago
Income			
Contract R&D			
Product Sales			
Services other than Contract R&D			
Other			
Total Income			
Expenditures			
Cost of Goods Sold			
R&D			
General and Administrative			
Total Expenditures			
Gross Income Before Taxes			
Net Income After Taxes			

Balance Sheet	Current Year to Date	Last Year	Two Years Ago
Assets			
Current Assets			
Fixed Assets			
Total Assets			
Liabilities			
Current Liabilities			
Long-term Liabilities			
Stockholders Equity			
Total Liabilities and Equity			

Employment Information	Number of Employees		
	Current Year to Date	Last Year	Two Years Ago
Full Time			
Part Time			
Full Time R&D			
Part Time R&D			

Table 4: Federal Awards Received By Company/Organization or Principal Investigator for All Technologies for Previous Five (5) Years (Example)

Project Title	Award No.	Total Federal Award ($)	Performance Period (M/Y to M/Y)	Name of Principal Investigator, Address, & Phone No.	Name of Federal Agency, Federal Program Manager, Address, & Phone No.

D. REQUIRED LETTERS (letters do not count toward the page limit)

TIP reviewers scrutinize the content of letters very carefully to understand the actual commitment of the signatory. Table 5 summarizes which letters are required under what conditions. The remainder of this section discusses what is required in each type of letter.

1. Letters of Commitment

Letters of commitment commit specific resources to the project if the project is funded.

a. Single Company Proposer–A letter of commitment from an authorized senior executive of the company is required to indicate the importance of the project to the company and the company's commitment to supply key resources (e.g., the time of key personnel, cost sharing, equipment, and facilities).

b. Joint Venture Proposer–Letters of commitment from an authorized senior executive of each organization in the joint venture are required to indicate the importance of the project to the organization and the organization's commitment to supply key resources (e.g., the time of key personnel, cost sharing, equipment, and facilities). In addition, the Form NIST-1022D, Third Party In-Kind Contribution (see Exhibit 7) must be completed.

c. Contractors–Letters of commitment from contractors who are key to the technical plan's success are useful for verifying the availability of resources, but are not required.

d. Prospective Employees–Letters of commitment to join the proposing organization's team are useful for verifying the availability of key personnel who are not yet employed at a proposing organization, including joint venture members, to participate in the project if the project is funded. These letters are not required but they can play an important role in conveying the appropriateness of key staff members, especially for projects involving small companies or startups.

e. Letter of Commitment for Third Party (External) In-Kind-Contributions–A letter of commitment from an authorized senior executive of any organization providing third party in-kind-contributions that are to be used as cost share is required. This letter should clearly state the form(s) of the third party in-kind contribution, value of the in-kind contribution, and the time period over which the third party in-kind contribution is to be made.

f. Letter of Commitment for Third Party (External) Cash Contributions–A letter of commitment from an authorized senior executive of any third-party (external)

organization providing cash contributions that are to be used as cost share is required. This letter should clearly state the amount of the cash contribution, the time period over which the third party cash contribution is made, and interim performance requirements for phased contributions, if any.

2. Letters of Support

Letters of support indicate a willingness from potential members to become involved later in the project if it is funded. General letters of support for the project do not make the proposal more competitive unless the organization/person supporting the project is planning to provide funding, to participate in diffusing the technology/impacts from the project, or to become part of the project to actually help perform specific research that at the outset of the project may not be needed.

a. Contingent Funding–Sometimes a potential investor will indicate a strong interest in evaluating the results of a project for possible future uses. This type of letter can help verify that the pathway to further uses of the research in the proposal has been studied and is feasible. *If this funding is critical to the financial viability, or is critical to or may be used as cost-share of the organization, a letter is required.*

b. Strategic Partner–Strategic partners can aid the future potential for the research to yield transformational results and in the diffusion of the technology beyond the proposer. Letters of support from strategic partners that demonstrate that the research has the potential to yield transformational results and is likely to benefit the nation are helpful in the proposal evaluation process. If letters are not available, but there has been some contact with a potential strategic partner, the proposer may document the contact in a paragraph, providing name, title, organizational affiliation of the contact, date of the contact, and extent of the contact. This paragraph can be included as an appendix, and does not count toward the page limit.

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c. Potential Additional Research Performer

This might be an additional contractor to a single company award, or an additional joint venture member, or contractor to a joint venture that may become necessary if a particular alternative approach in the technical plan becomes critical.

3. Letters of Corroboration

Letters of corroboration documenting each proposer's efforts, including each joint venture members' efforts if a joint venture, to secure other funding prior to seeking funds from TIP are required. This especially includes letters from potential funding sources indicating why they chose not to fund the project. If such a letter is not available, proposers must document the interaction with funding sources as discussed in Chapter 2 Section C.2 entitled "Efforts that the Proposer Has Made to Secure Alternative Funding."

Information documenting such efforts should include the following:

a) Name and title of the person who decided not to fund the project.
b) Organizational affiliation.
c) The reason given for the decision, and
d) The date the decision was conveyed, and to whom it was conveyed.

This should be done for each funding source that was approached and declined to fund the project, and displayed in a table format. This table does not count toward the page limit.

Table 5: Summary of Types of Letters – Required or As Appropriate

Type of Letter	Required	As Appropriate
1. Letters of Commitment		
a. Single Company Proposer	Required–-signed by authorized company official to document commitment of cost share and other key project resources.	
b. Joint Venture Proposer	Required from each joint venture member–-signed by authorized organization official to document commitment of cost share and other key project resources.	
c. Contractors		Optional–-useful if contractor is critical to project
d. Prospective Employees		Optional–-useful if key personnel are not yet organization employees
e. Third Party In-Kind Contributors	Required–-signed by authorized organization official to commit third party in-kind contributions.	
f. Third Party Cash Contributors	Required–-signed by authorized organization official to commit third party cash contributions.	
2. Letters of Support		
a. Contingent Funding	Required when funding may become part of the cost-share of the project.	
b. Strategic Partners		Optional–-Letters from or descriptions of contact with potential strategic partners
c. Potential Additional Research Performer	Required if the organization/person is associated with a critical alternative research approach identified in the research plan, but is not originally part of the project if the project is funded.	
3. Letters of Corroboration		
Letters of corroboration, documenting efforts to secure other funding	Required--Letters from or descriptions documenting contact with funding sources and the outcome.	